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Master in Corporate Finance

FINANCIAL EFFICIENCY VALUATION OF CATEGORY PROMO ACTIVITIES (THE CASE OF LENTA)

Master's thesis by the 2nd year student

Concentration – Corporate Finance

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АННОТАЦИЯ

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Название ВКР	Оценка финансовой эффективности категорийных промо-акций (на примере ООО «Лента»)
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Научный руководитель	Никулин Егор Дмитриевич
Описание цели, задач и основных результатов	Существенный рост продаж через промо акции является глобальной тенденцией для компаний розничной торговли. По информации из отчета PwC, доля промо-акций в Европейских розничных сетях достигла 30%, для российских компаний эта цифра значительно больше. В таких условиях тяжело выделить отдельный финансовый эффект на компанию от конкретных промо мероприятий. Существует механика промо мероприятий, которая подразумевает продажу товаров в убыток для привлечения дополнительного потока покупателей в торговые комплексы. В Ленте, крупнейшей сети гипермаркетов в России, такая механика используется много лет, однако реальный финансовый эффект от ее использования остается неопределенным, потому что этот эффект является косвенным, его невозможно получить напрямую из финансовой информации. Данное исследование предоставляет модель для оценки финансовой эффективности вышеупомянутой механики с использованием метода базового спроса. Результаты показали, что данная промо механика действительно финансово выгодна для компании, но доходность может существенно отличаться между продуктовыми категориями. Предлагаемая модель разработана для финансового контроллинга с целью оптимизировать процесс бюджетирования и промо

	планирования. Данный подход хорошо применим для розничных сетей с высокой долей промо продаж.
Ключевые слова	Категорийные промо-акции, трафик, метод базового спроса, средний чек, контроллинг, бюджетирование.

ABSTRACT

Master Student's Name	Bragin Ilya
Master Thesis Title	Financial Efficiency Valuation of Category Promo Activities (The Case of Lenta)
Educational Program	38.04.02 Management
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Description of the goal, tasks and main results	Global tendency in retail is dramatically growing share of sales obtained through promotion activities. According to PwC, for European retailers promo share reached 30%, for Russian retailers this number is significantly higher. In such conditions it is hard to separate a financial effect of specific promotion activity on a company. Loss leader category promotions stand for selling goods with price lower than initial with negative margin in order to attract additional store traffic. In Lenta, the largest hypermarket chain in Russia, such mechanic is used for many years, but its real financial impact on the company remains uncertain, because the effect is indirect, and it cannot be obtained from financial information. Current research provides a model for financial efficiency estimation of loss leader promotions using the baseline demand approach. The results showed that such mechanics are indeed profitable for Lenta, but the profitability can vary significantly between product categories. The proposed model is designed for the use of financial controlling to enhance the process of budgeting and promotion planning. The approach is best applicable for retail companies with high promotion share.
Keywords	Loss leader promotions, traffic, baseline demand approach, average receipt, controlling, budgeting.

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Introduction

Russian food retail market can be characterized as low consolidated and highly competitive. Russian retail develops rapidly every year, consumers nowadays are able to get unique shopping experience impossible to imagine even 10 years before. Russian food retail chains come through automatization, diversification and digitalization. It is common to implement self-scanning and self-checkout equipment, that potentially significantly accelerates services and improve stores traffic. All major Russian food retail chains invest in diversification by developing different store formats, such as convenient store, supermarket and hypermarket, working with different costumers' segments and providing the most appropriate and beneficial services for them. Digitalization significantly affects Russian retail chains, lose positions in digital space means lose significant competitive advantage. In recent years retail chains in Russia significantly increased their digital presence from accounts in social networks to developing mobile applications. Digital presence enables companies to achieve many important objectives: to maintain and increase client base, to provide clear and noticeable communications about conditions and events, to manage loyalty programs and analyze consumer behavior.

Russian retail market changes not only in terms of new technologies and strategy, but also in terms of environment specifics. Global tendency in retail is dramatically growing share of sales obtained through promotion activities. According to PwC report, for European retailers promo share reached 30%, for Russian retailers this number is significantly higher. Based on the information from public disclosures of Russian retail chains, promo share has already reached 50%. It means that half of the revenue or even more is collected via promotional activities. First, it means that price promotions are no longer attractive instrument of retail managers to boost short-term KPIs, but necessary part of routine operations. Second, big promo share signs that there is high extent of price competition between market players.

Most of the promo share relates to classic promotion activities, such as catalogues, weekly offers, billboard and TV offers. The feature of this promotions is that they are usually compensated by suppliers and that they have lower but positive margins. The objective of such promotions is to use high demand elasticity to boost sales and increase profits. It means the higher sales of promoted goods the higher the promotion profitability. In a line with classic promotion activities there is relatively new type of promo called loss leader promotions that is widely used among Russian retailers. Loss leader promotions means selling the promoted items with price below the purchase price with negative margin in order to attract customers. In contrast to classic promotions, the

objectives of loss leaders are generation of traffic and stimulation of complementary purchases. While the financial effect of classic promotions is relatively clear because it is represented by intervention period sales bump of promoted items, the overall effect of loss leader activities on other categories and overall companies remains uncertain. When promoted items are sold with negative margin, the more the sales the more the loss. As loss leader promotions are supposed to have indirect effect on sales and traffic, true effect on the overall store can me estimated only by building models of casual relationships between different variables.

While retailers believe and invest in loss leader promotions though their true effect remains uncertain, there is a practical gap in estimating the financial effect of loss leader promotions on the overall company for more efficient promo planning and management. The tangible effect of such estimation will appear directly with identifying of unprofitable promotions.

Previous researches on the topic of loss leader promotions suggest that there is positive correlation between such promotions and store traffic and sales. Nevertheless, while the relationship of loss leaders with sales is approved by data in the majority of researches, the evidence of impact on traffic is diverse. The existing literature suggest that loss leader promotions might have different effects on traffic depending on the category and the nature of the promotions. While there was an evidence of price promotions affecting complementary sales of merchandise with a regular price, there is weak evidence of loss leader promotions stimulating the purchase of regular price products. The main dependent variables in most of the researches, as it is expected, are overall store traffic, sales and profitability. The independent variables are very various, the use of categorical variables is very often. The baseline method to assess the impact on store traffic was suggested, the method stands for model to predict regular demand during the intervention period. The impact of promotion is calculated by subtracting the predicted demand from actual demand.

Lenta is the third largest retail chain in Russia and is the largest hypermarket chain. Loss leader promotions in Lenta is realized in form of “crazy discounts”, the fixed discount on selected product category with one day duration. The conventional intuition behind such promotions in Lenta is to boost store traffic and sales. Based on the insights, there is no complex approach to measure the financial effectiveness of such promotions in Lenta. Nevertheless, managerial intuition with respect to “crazy discounts” is strong and the amount of such promotions grows as they are treated as the main traffic builders.

Thus, the research goal is to build practical model to estimate the true financial effect of category loss leader promotions on example of Lenta retail chain.

To reach the research goal it is required to answer following questions:

1. Do loss leader promotions in Lenta generate incremental store traffic?
2. What product categories are the most successful in generating additional store traffic?
3. Are there any product categories promoted through crazy discounts with no estimated additional traffic?
4. Does estimated average receipt for additional traffic differs between categories and during crazy days discounts in Lenta?
5. What is the estimated post-promotional cannibalization effect for crazy discounts promotions in Lenta?
6. Are loss leader promotions in Lenta financially effective?
7. What is required to implement new approach of loss leader promotions estimation into current Lenta's planning and managing processes?

The proposed model is designed for the use of financial controlling to enhance the process of budgeting and promotion planning. Financial controlling plays a key role in promotion planning by performing budgeting and execution control, also controlling provides the estimation of financial efficiency of different activities. Nevertheless, current approach for promotion planning and control of loss leader promotions does not give a view on their profitability. The reason for that is high promotion share and inability to find isolated effect. The previous existing attempts of financial controlling to estimate the indirect effect of loss leader promotions were abandoned and the new methodology is required.

As it is shown above, the research has practical gap to cover. The research has strong managerial application for Russian retail companies. As retail has developed category management, the existence of planning and budgeting is vital. While common plan-fact approach is fully applicable for classic promotions, it is not that effective for loss leader promotions because of their different objectives and nature. At the current moment, Russian retail practitioners are lack of understanding of true effect of loss leader promotions except from managerial intuition. The insights of real financial efficiency of loss leader promotions provide an opportunity: to build expectations and set up goals to managers in accordance with overall company strategy; to control the execution of these goals; to obtain better understanding of what promotions are most beneficial for company; to improve the overall promotion effectiveness.

1 Theoretical aspects of loss leader promotions analysis

1.1 Loss leader promotions

At the current point of state of Russian retail market players mostly compete in price, price promotions and their effectiveness. An apparent sign that price competition is crucial for the Russian retail market is that it is common situation when major players communicate via different channels about the same promotion offer, it happens as a result of one competitor's reaction, the phenomenon in managerial economics that is called predatory price cutting The share of sales through promotions in Lenta grows every year and at the moment more than a half of the retailer's revenue is gained through promotion activities. Price promotions on the Russian retail market is no longer an attractive instrument to boost short term results, but a usual and necessary part of management.

The economics and marketing literature provide several theories that give a rationale for short-term price reduction. These theories are price discrimination, difference in consumer information, transfer of inventories costs and diminishing demand over time [Francis J. Mulhern & Daniel T Padgett, 1995]. Most of the empirical base for these theories focus on investigation of the promotion effects on market share, brand switching and loyal acceleration. But as long as these theories were developed for individual brand promotions, they do not go along with multiproduct nature of retail. Retailers use price promotions also to stimulate sales regular price merchandise. Such multiproduct orientation is closer to bundling theory of managerial economics.

In Lenta there are many types of promotion activities, that are aggregated on the basis of communication support. The most popular and classic type of promotion aggregation and communication is catalogues. Usually, catalogues have printed form and are distributed inside the stores or through mail. Printed catalogues are very popular among the food retailers as well as non-food retailers. It is convenient and intuitively clear for customer tool to communicate about current promo offers, catalogues are used by most of the Russian retailers of all store formats and types. Promo catalogues are that effective because they allow to demonstrate a substantial amount of offers to consumer at the same time without losing the attention (an average catalogue in Lenta consists of approximately 1000-2000 thousand SKUs). In Lenta there is always a regular catalogue, that changes every two weeks, and there are various seasonal catalogues that are flexible in terms of periods, themes and number of SKUs. As retailers adapt to development of digital

technologies, the usual printed catalogues distribution is put under doubt in favor of digital catalogues, that are more accessible, interactive and cheap, but, in practice, not that big portion of consumers in Russia is active digital users.

Due to high merchandise volume catalogues promotions are supposed to take the most significant share in sales of Russian retailers. Apart from catalogues, there are other types of promotions that are common for Russian retailers and they are associated with higher level of external communication, such as TV advertisement and billboards. Contrary to catalogues, these promotion activities usually consists of very few offers, but which are supposed to be the most attractive. They can be characterized as intensity over volume. Price monitoring is very important for such type of promotion, as its main aim is to attract customer with the best price offer, which is meaningless if there is lower price in competitor's store.

All mentioned above types of retail promotions can be called as classic, because all of them are supposed to generate additional sales for promoted goods. The reason is that the offers are sold with lower, but positive promotional margins. It happens because most of the offers are compensated by suppliers. Until goods have positive margin and lower price, they will be sold in higher volumes, that will result in higher profits. In other words, the efficiency of such types of promotion is mostly measured by sales of the promoted merchandises, such as *the higher sales the higher profits*. To conclude, classic food retail promotions have positive margins, but lower than regular, that are mostly compensated by suppliers and are supposed to result in higher returns due to increased sales of promoted goods.

Contrary to classic promotions, there are loss leader promotions. Loss leader strategy is selling a product with non-profitable price (or with negative margin) in order to increase traffic and to stimulate sales of other merchandises. In Lenta loss leader strategy is realized in form of "Crazy discounts", which are defined as very deep discounts on a specific product category only during very narrow period (one or several days). Such promotion type is relatively new for Lenta, and it is characterized with more intense and client-oriented communication. The key difference of loss leader promotions in terms of financial effect because as long as promoted goods have negative margins, *the higher sales result in higher loss*. The idea behind loss leader promotions is that they will increase traffic and stimulate sales of other categories which together will result in positive returns. There is an empirical evidence in previous studies that loss leader promotions positively affect store traffic. In general, retailers and researchers believe that loss leader promotions stimulate not only the sales of negative margin promoted items but also the sales of high margin goods that are not promoted [Walters, R. G., 1991]. The most logical benefit of loss leader promotions is to attract customers that would not visit the store otherwise. Previous

researches demonstrated that there is an existence of a deal-prone segment in consumer population and benefits from attracting this segment to store may be substantial. Loss leaders are relatively popular because purchases of compliment and other non-promoted items are common that reduces the risk of promotion being unprofitable [Walters, R. G., 1986].

Although retailers may follow different goals when discounting prices the most frequent objective is to boost sales and traffic. Temporary deep price reductions are supposed to attract consumers into store and stimulate purchases of items at regular price. The effectiveness of that strategy depends on two factors – ability of promotion to attract the customers and ability of promotion to generate bundles of products. The best scenario is when customers are attracted to a store and purchase several other products at regular price. The worst case is when customer arrives to a store and buys only discounted products and this mean loss leader promotions being completely unprofitable [Mulhern, F. J., & Leone, R. P., 1990]. Hence, there are two possible positive effects for loss leader promotions: store traffic increase and increase of sales of non-promoted items. Thus, the incremental sales growth during loss leader promotions is a combination of these two factors. While there is an empirical evidence that loss leader promotions affect both, still the strength of the effect depends on the nature of promotion and the promoted category. For example, promotions of some categories may produce lower sales of complementary goods simply because few of them exist. Conventional idea that sales of promoted products stimulate sales of non-promoted products was not supported by data in the research of Walters, R. G., & MacKenzie, S. B. (1988). They concluded that in some cases consumers just substitute non-promoted item with promoted one during their shopping trips. As the previous researches suggest, both store traffic and non-promoted items sales must be considered as positive financial outcome of loss leader promotions. Nevertheless, there is an empirical evidence of case when promotion boosts sales, but traffic remains stable [Mulhern, F. J., & Leone, R. P., 1990]. One possible explanation for such phenomenon is that loss leader discounts changed the customer base. For example, a promotion attracted segment that, on average, spend more money on a weekly basis on groceries than previous customer segments. It is reasonable that consumers who shop for large households are more attracted by low price. The difficulty is while the effect of classic promotions is direct and can be easily defined as the total amount of revenue, all effects of loss leader promotions are indirect, and they can be estimated through casual relationship between sales of promoted items and other factors.

1.2 Store efficiency measures

Previous researches on this topic suggest that there are three performance indicators available for a store: traffic, sales and profitability. Retail management is not of much interest about the effects for individual brand sales, but about the impact of promotions on overall store traffic, sales and profitability [Walters, R. G., & Rinne, H. J., 1986]. As the goal of this research is to measure the financial effect of loss leader promotions on the company, it is important to review actual empirical knowledge of how promotions affect these indicators.

Traffic stands for amount of receipts, or purchases, during the chosen period. Most of the big Russian retail chains, including Lenta, have already implemented very powerful ERP systems that allow to collect and process tremendous volume of data on the level of SKU. Past researches on store traffic suggest that it is crucial to manage and build store traffic, because it has an indirect positive impact on store profitability through its effect on non-promoted items. On the other hand, traffic may also fail to generate profits because low-income households are more prone to loss leaders than households with higher income. There is an evidence of deep loss leader promotions significantly affecting store traffic, but only for one category of eight that were studied [Walters, R. G., & MacKenzie, S. B., 1988]. Nevertheless, Mulhern and Leone (1990) did not find significant effect on store traffic of switching to strategy of deep discounts on fewer items from lower discounts on many items. While the effect of promotions on traffic remains mixed, mostly it is proved that there is positive and significant relationship between deep discounts and store traffic. Nonetheless, not all the categories and all promotions have the traffic generating ability [Gauri, D. K., 2017]. Moreover, loss leader promotions are still widely implemented by retailers, so that managerial intuition about their ability to generate traffic is constant. A possible weakness of previous research on this topic is ignoring parallel promotions intensity and other factors, so there is a possibility of omitted variables problem.

Sales measure is the same as revenue for a certain period, for a certain category or a certain promotion type. There three main features about economics in retail: high cross-elasticity of demand between different categories within the store; low gross margins; high variable costs. Economic science suggest that sales are more elastic to price changes and rather inelastic to volume changes. Stores are not interested in estimation of separate demand elasticities, but in estimation of effect on overall store. The results of previous researches on the relationship between store total sales and promotions are mixed, but mostly support the hypothesis of positive relationship between promotion activities and store sales. While Mulhern and Leone (1990) did not find the relationship

between loss leader promotions and traffic, they did find the strong effect on store sales. Mulhern and Padgett (1995) found a high correlation of promotion price purchases and regular price purchases. Ailawadi. (2006) found a large "halo effect", meaning that any additional unit sold with promotion price stimulate the additional purchase of other products. The halo effect of a promotion is positive, when promotion leads consumers to buy products from other categories in the store that possibly they would not buy otherwise. There are attempts in previous researches to estimate the halo effect of the price promotions, the most popular type of analysis for that purpose was regression models. Such empirical evidence is very supportive for this research as the main belief behind loss leader promotions in Lenta is that they can generate complementary sales growth in addition to traffic. Important to notice, that category managers are very lack of tangible halo effect estimations that would be reliable enough for managerial decisions and clear for understanding to some extent. To sum, the results of previous researches on the effect of deep discount promotions on sales are also mixed, but positive relationships are nearly always found, that gives an evidence that deep discounts in bundle with strong client communication are associated with increasing sales growth.

In modern Russian retail it is very hard to estimate the profitability on the daily basis and on SKU level. The reason for that is complicated system of relationships between retailers and suppliers. The usual gross margin in food retail consists not only of difference between revenue and cost of goods sold. Cost of goods sold stands for final price paid to supplier for purchases. Current trade law and business specifics allow suppliers to pay extra money to retailer on the basis of the supply for a variety of reasons. Such payments from suppliers are usually treated as bonuses and always included in gross margin because they are directly dependent on the sales volume. There are many types of bonuses that contribute to gross margin. Volume bonus is the fixed percentage of buying volume, marketing bonus is a payment for additional merchandising conditions, promo compensation is a payment to compensate a price promotion, suppliers often pay additional bonuses for logistics and distribution, there are penalties and other possible payments as well. There is no strict structure and rules for collecting such payments, and final financial result can be obtained only as for financial period end. As bonuses are collected in aggregated form, the allocation of them between categories or divisions is analytical process and special personnel of financial department is usually responsible for that purpose. As a result of processes described above, the profitability of categories is not accessible on a timely basis and cannot be analyzed by days. As a result, all the previous researches done on the relationships between promotions and overall profitability are not applicable for Russian retailers to a full extent. Nevertheless, it is reasonable to review the previous work done on the relationship between

promotions and profitability. Evidence on such relationship is also diverse. Walters and Rinne (1986) found that there is almost no effect of loss leader promotions on profitability. However, Mulhern and Padgett (1995) found that consumers who visited store because of promotion and bought a promoted item, also bought a bundle promoted and non-promoted goods that were profitable on average. Contrary, Ailawadi (2006) found that more than a half of loss leader promotions are not profitable. In contrast to store traffic and sales, past research did not support the idea that there is an incremental growth enough to compensate for negative margin of promoted items [Gauri, D. K., 2017]. Nevertheless, the empirical evidence breaks with managerial intuition, because loss leader promotions are still very popular nowadays among retailers. The fact that though there is an evidence of loss leader promotions being non-profitable still implemented approve the existence of the research gap. Possible reason for that inconsistency was described above is that basic gross margin of retailers does not represent final profitability. Thus, as profitability is not final the results of previous researches possibly biased to some extent.

1.3 Promo efficiency measures

Based on the information above, consumer prices promotions occur in everyday operations of all store formats. Price promotions are very effective in short-term sales increasing, which is usually set up as KPI of both retailers and manufacturers. At the moment, for some companies promo sales share in revenue already reached 50% and this trend continues, despite there is an evidence that price promotions have negative long-term business effects such as higher consumer price sensitivity and decreasing brand loyalty [Bogomolova, S., Szabo, M., & Kennedy, R., 2017]. There are possible long-term effects of price promotions. First, long-term change in future behavior of consumers who visit a store in response to a promotion. Such shoppers may their store patronage patterns to take advantage of price discounts. The potential of loss leader promotions is to generate future shopping trips of these customers by managing the combination of promoted items. Possibly loss leader activities can convert one-off shoppers to loyal customers. Having such strong effect on individuals, price promotions can be used to build strong relationships with suppliers. For example, retailer can combine loss leaders with individual brand promotions by providing discount only for those who bought required numbers of a specific brand. Unlike the manufacturers, retailers have multiproduct nature and there is no risk of decreasing brand loyalty or brand switching. Retailers use price promotions to attract consumers to the store and increase

sales of regular price assortment. There is an evidence of positive relationship between price promotions and regular price purchases [Francis J. Mulhern & Daniel T Padgett, 1995].

Price promotions cover a variety of short-term goals, because are able to stimulate an immediate market response. Historically, it was manufacturer's incentive to convince a retailer to commit instore promotional activities. There were at least two reasons why they usually were successful. First, a retailer directly benefits from the increased sales of the promoted goods. Second, in most of the cases manufacturer maintained the retailer's margin on the same level. However, modern technologies allow retailers to collect and analyze data on the lowest aggregation level, such as receipts, clients or even product lines. Due to the business nature, this information is usually not available for the manufacturer, because he is not in the last point of the distribution chain. Such shift in the information availability resulted in shift in terms of promotion activity. As the information of retailer is of higher quality, they are more effective in creating required short-term market response. As a result of market consolidation retailers now conduct promo campaigns independently from manufacturers investing their own money to stimulate sales and traffic. This power shift is also explained by the difference between objectives of the retailer and those of the supplier. The supplier's primary aim is to increase sales by increasing consumption of current clients and stimulating brand substitution. However, sales increase is the short-term effect, manufacturers expect the brand substitution to be more long-term. In contrast, the retailer's primary goal is to increase the profitability of the store, and while the one brand or category is unable to impact the overall profitability substantially, the goal of price promotion is to attract more customers in the store and stimulate for other purchases. Hence, it is vital for retailers to assess the effectiveness of price promotions not only in terms of sales of promoted goods but also assess all the possible effects of the promotion on the store.

While retail managers invest in price promotions, the financial results of such promotions remain uncertain. A manager who plans a promotion campaign must attempt to increase one of the following: traffic, amount of sales, supplementary sales. One of the significant obstacles that of measuring the performance of promotions is lack of baseline data to assess the changes. If there is no baseline, a retailer is unable to estimate neither additional traffic nor returns on the investment. The prior researches suggest, that a possible way to assess promotions efficiency is to build model for calculating the baseline indicators, such as traffic or sales to estimate the incremental effect on them due to promo campaign [Epstein, L. D., Flores, A. A., Goodstein, R. C., & Milberg, S. J., 2016].

According to PWC's report, the most common way to assess the promo effectiveness is to calculate ROI of the investment. The incremental sales or margin are taken as return, and margin

decrease is the measure for investment. The main problem for this approach, as it was stated earlier, the estimation of baseline sales. Only additional sales and margins over the regular demand reflect the effect that was driven by the promotion. Frequently, retailers face the problem to develop the methodology of calculating the baseline sales, therefore the estimation of promotion effectiveness can be biased or rely on intuition. As the share of sales made through the promotions grows and the roles of different promotion activities are different, the management requires clear and transparent KPIs to reach a company's promotion strategy goals. Thus, the estimation of financial effectiveness of promotional activities is impossible without calculating the baseline, because the nature of most of the price promotions is to create short-term uplift in one of the factors. While the baseline is required for estimation of effectiveness, it is also needed to set up KPIs for managers, because all the managerial decisions are supposed to assume some expectations that should in accordance with overall strategy of a company.

Calculation additional return of promotional activities in relation to baseline is not the only one obstacle to estimate the performance of promotions, it is also necessary to include the effect on the overall product assortment and other costs. It is proposed to calculate additional returns over the baseline demand during the promotion period, but it also makes sense to assess the decrease under baseline demand in the period after the promotion. This type of costs appears, because shoppers are likely to stock up during the promotion period and spend less in the following periods. Hence, it is fair to consider not only promotional period uplift, but also after-promotion decline as costs. Cannibalization of substitutes is another unobvious cost of promotion activity; it means lower sales of goods that can be substituted by promoted items. Retailer lose some part of regular demand due to switching of customers from substitutes to promoted item. There is an empirical evidence of negative correlation between sales of the promoted brands and its direct substitutions [Kumar, V., & Leone, R. P., 1988]. Substitute cannibalization must be included as a cost in assessing of financial efficiency of promotion. Last but not the least are usual direct costs on the promotion, such as communication with customers, printing materials, change of layout and prices. If the efficiency is calculated in sales, it is necessary to adjust for lower margins during the promotion, in case price discount is not compensated by suppliers.

Stockpiling is a natural consequence of price promotions, because under promotion customers are more likely to buy than usually or sooner than usually. In other words, consumers end up with more volume than they would in the absence of promotion. Nevertheless, for the manufacturer the stockpiling phenomenon is not negative in all cases, it depends on how customers behave after promotion or how they intend to behave. If extra inventories decrease the future purchases of promoted brand, then this is a cost for a manufacturer, because during promotions

products are sold with lower margins. Such term in marketing science is called *loyal acceleration*, and for a retailer it also means costs but only if this phenomenon spread over the category, because retailers are not sensitive to brand substitution problems. If extra volumes purchased during a promotion preempt future purchases of competing brands, it results as a profit for a manufacturer because of increased market share, but on the other side it is a cost for a retailer, because it simply means the cannibalization of future demand for the category. Such term is called *preemptive switching*. The possible effect of stockpiling for a retailer is called *consumption effect*, it means that extra inventories stimulate people to consume more after the promotion. Researchers recognized and attempted to estimate the effect of consumption, loyal acceleration and preemptive switching. Previous researches on the topic suggest that consumption effect is more common for new users and for very short range of categories [Ailawadi, K. L., 2007]. There is also an empirical evidence of loyal acceleration and preemptive switching existence, though these effects are very hard to separate from regular post-promotion behavior [Ailawadi, K. L., 2006]. To summarize, as there are possible positive effects of stockpiling for manufacturer, there is a very rare case that retailer will benefit from price promotion stockpiling. There are two reasons for that: first, products during price promotions are sold under discount with lower margins; second, stockpiling can be considered as cannibalization, because future decrease in sales possibly can be more intense than the initial uplift.

For a retailer, cannibalization means future reduction of category sales after the promo intervention period. The previous studies on cannibalization effect of short-term price promotions suggest that different categories have different extent of cannibalization effect. What is very important about cannibalization effect, researchers generally agree that for some stores and categories cannibalization possibly dominates the sales bump effect during the promotion. Moreover, past researches did not find any significant cross-category cannibalization effects [McColl, R., 2020]. Important to notice that in relation to Lenta the only possible cannibalization effect of loss leader promotions is post-promotional decline of demand, because promotions of that type in Lenta include the whole chosen product category. Thus, loyal acceleration and preemptive switching are simply impossible because a promotion cover the whole category. Retail managers particularly in Russia pay very low attention to cannibalization effect and it is never included in KPI. Nevertheless, as empirical knowledge suggests this effect might be crucial and obligatory in assessing full promotional effectiveness. Intuitively, the effect can be a way stronger in case of loss leader promotions because of their short-term nature and very deep discounts. The possible way to assess the financial impact of cannibalization is to calculate the difference between post promotion period indicators and estimated baseline indicators. The negative differences

between post promotion indicators and baseline may be an estimated financial impact of loss leader promotion cannibalization.

Price promotion activities in situation of intense competition must be documented. The only way to improve promotion practices is to learn how past promotions affect sales, traffic and profit. For instance, if "crazy discounts" on clothes and underwear in Lenta has a *significant* negative impact on company's profitability, knowing that managers would rather choose another category or decrease the amount of such promotions to reasonable minimum. As it was outlined above, to assess a loss leader promotion to full extent it is important consider all the following effects: *incremental to baseline uplift* overall for a store, *communication costs*, *margin losses* of promoted category and post-promotion *cannibalization*. Knowing these components, the retailer is able to build profit and losses (PL) model for a certain promotion and based on its result conclude on the promotional financial effectiveness. As it was mentioned earlier, such approach is not a regular PL model because two of four components are indirect and cannot be found within any of financial transactions.

2 The financial efficiency of "crazy discounts" in Lenta

2.1 Russian retail market

Russian food retail market in recent years has faced a variety of adverse factors stimulating the decrease of consumer spending. In 2019, the pressure on Russian grocery chains from macroeconomic environment continued. Russian GDP dynamics decreased to 1,3% in 2019 from 2,5% in 2018, influenced by both internal and external factors [Lenta annual report, 2019]. The slowdown of global economy affected the country's export, while weak dynamics of real income, tight monetary policy and other factors affected the internal economic growth. The main factors affecting the food retail market are falling consumer price index and volatility of real disposable income. Due to all these factors consumers stay careful and very sensitive to price changes. Food inflation has been slowing down up to the beginning of 2020. While lower inflation is beneficial for consumers, it also put pressure on retailers' revenue growth and forces them *to intensify promotional activities*.

The consolidation of food retail market is relatively low as top-7 market players hold 30% of market share in 2019. According to international standards, Russian food retail market can be qualified as fragmented, providing opportunities for future consolidation. The level of competition remains very high and it increases because of need to adapt to the new consumer behavior. As consumers are less confident in economy and their near future, they tend to save more. Thus, the role of the price as a choice factor grows, and food retailers work in the direction of promotional efficiency and price perception. Nonetheless, it is important to notice that assortment, quality of goods and services, communication and digital experience remain substantial drivers of consumer perception. After years of aggressive growth, the competition now is distributed among the largest players. Competition on prices and promotion is supposed to slow down, because it negatively affects margins and profitability, and retailers in near future possibly will change their focus from opening new stores to increasing profitability and efficiency. According to Magnit, Russian market of food retail enters the maturity phase when the growth of the market is slightly higher than overall economic growth. Most of the largest players reported that pay more attention to operational efficiency and costs control, the strategies shifted from aggressive to balanced growth. Nevertheless, the key priorities at the current moment are *efficiency in promotional offerings* and *communication with customers* through development of digital tools.

Top-3 retailers by market share in 2019 are X5 Retail Group, Magnit and Lenta. All the companies develop multi-format model to some extent. The most popular food retail store formats in Russian are as following: supermarket, convenient store, hypermarket. At the recent years there is a growing interest to other formats, such as hard discounters and gas station stores. The main asset for X5 Retail Group is convenient stores under the Pyatorochka brand, they also develop supermarkets under the Perekryostok brand and hypermarkets under the Karusel brand. The main format for Magnit is convenient store, but they also develop supermarkets, pharmacy stores and cosmetics stores. Lenta is the biggest hypermarket chain in Russia, the company also started to develop the supermarket format, but its share is under 10% in revenue at the moment. Nevertheless, Lenta supermarkets show strong sales growth every year. In terms of revenue, convenient stores are the most popular format in Russia at the moment, the second is supermarket format and hypermarkets mostly presented by Lenta. The idea behind the convenient store format is minor purchasing for tonight, while supermarkets and hypermarkets are designed for major purchasing on the special occasion with substantial stock-up and significantly higher number of SKUs presented. Every format has its own specifics, such as price policy, average receipts and attendance. The scale and diversification help companies to offer the most competitive and attractive conditions for customers with use of promotion activities.

2.2 Category management and promotions in Lenta

In general, there are two types of product prices in Lenta: *regular* and *promo*. Regular price means that there are no discounts for customers presented on shelf. The only difference of regular price is the absence of visible price reductions, it does not necessary mean that regular price of a product is always higher than the promo price of another product in the same category. Also, regular price does not guarantee that it reflects the consumers' reservation prices, because there are categories where consumers does not react on the price unless there is a reduction. Consequently, promo price is just regular price with apparent to the customer reduction. In 2019, approximately 50% of revenue was collected via reduced prices or, in another words, promo prices. The share of sales through promo prices is called promo share and it has constant tendency of growing from year to year.

With such high and dramatically growing promo share price promotions are no longer an attractive marketing tool, but common everyday part of pricing and supplier negotiations

processes. First, regular price of any product is supposed to somehow correlate with its regular demand, while promo price is supposed to reflect an abnormal high demand. With grown more than 50% promo share the consumers behavior is different, because promo prices are more usual and in some cases are taken for granted. Thus, there is now no clear border between regular demand and increased demand, for some product categories, such as detergents, the demand curve is so shifted that customers perceive promo price as normal and regular price as unreasonably high. As it was stated earlier, price is the main aspect of competition between Russian food retailers nowadays and Lenta is not an exception, and while price promotions are the main method of this competition companies are forced to accelerate price discounts and increase promo share. Promo sales are on average 5 times higher than regular but, of course, have lower margin as for supplier and for retailer. Regular margin is on average twice higher than promo margin and the role of managers to maintain the balance while negotiating with suppliers, because both Lenta and suppliers are interested in higher profits, while long-term and short-term goals for retailers and suppliers are different, based on the managerial experience and existing literature. It is very important for Lenta while negotiating with suppliers to outline the proposed promo intensity and possible compensations, because adverse commercial conditions may result in stock-ups and margin losses.

Lenta has well developed category management system, commercial department is separated into three main product directions, each of which is separated into many product categories. Each product category is under control of a manager, this person is responsible for purchases, definition of the assortment, pricing and all communications with suppliers on the side of its own category. Commercial managers are one of the most important elements of Lenta and retailers overall. As all managers, commercial category managers require clear financial KPIs, because their area of responsibilities is within one category, while it is important to have goals in accordance with overall company's plan. Important point is that all the categories have different conditions in terms of *law, commercial conditions, sales and profitability requirements*. Hence, it is impossible and unreasonable to set-up the same KPIs for all managers, because each separate category occupies its own part of the overall commercial strategy. For example, some categories are supposed to generate traffic, others are supposed to generate higher profitability to cover other's losses, some are just socially important. Moreover, every category manager usually defends its own interests while communicating with other categories, because in many situations there are business conflicts. The last but not the least it is important to create reasonable and effective motivation system, renumeration policy must rely on KPIs execution stimulating managers to reach the overall company's goals. Based on the arguments above, there is a clear

need for independent structure in the company that can set up financial goals for overall company, separate and translate them on the category level and control their further execution. In Lenta such role is hold by commercial controlling department that is a part of financial direction.

Controlling in Lenta is an integrated system of informational and analytical support of company's management in terms of planning, control, analysis and managerial decisions in all functional departments oriented on reaching established goals. In another words, controlling is function of company's financial management, aimed to improve effectiveness and provide positive result. Commercial controlling is a business partner of commercial department and the main responsibilities are:

1. Sales and margin budgeting and forecasting;
2. Budget execution analysis;
3. Commercial conditions analysis;
4. Commercial initiatives assessment;
5. Analytical support for managerial decisions.

With more than 50% of promo share financial analysis of promotions is under the scope of commercial controlling, because they affect both sales and margins, thus, overall company's profitability. Promotion intensity is defined by commercial department, there are reserved number of quotes for each category. Nevertheless, while more than 50% of revenue is collected via promotions, controlling is required to assess their effect on company's sales and profitability and to set up KPIs for different promotion activities as well as to further control their execution. From that point it is important to clarify what is the promotions structure in the company and how the process of promotion planning, and control is performed in the company.

The types of promotions are defined on the basis of the type of communication support. There are four main promotion types in Lenta: *regular catalogues, seasonal catalogues, billboards and weekly offers*. Regular catalogues in Lenta are presented constantly, the period of each catalogue is two weeks. Regular catalogues are the most fulfilled with SKUs promotion type, each catalogue approximately consists of 2000 different products. Regular catalogues' offers are supported with printed versions distributed both instore and by post. Seasonal catalogues are not presented constantly and reflect a specific theme, therefore the periods of such catalogues are more flexible. The sales share of both regular and seasonal catalogues is approximately 35% of total company's sales. Billboards and weekly offers also presented constantly as in case of regular catalogues, but the period of weekly offers is one week while billboards offers last two weeks. As it comes from the term, billboards offers have strong communication support outside the stores.

Weekly offers only have instore communication. The share of facades and billboards is approximately 5% of total sales. All the described above promotion activities take approximately 40% of company's sales and can be qualified as classic or regular promotions.

Most of the offers in regular promotions have similar mechanic: price discount, which is usually compensated by suppliers, higher sales due to lower price but at the same time lower margin, known as promo margin. Such mechanic is relatively easy to operate in terms of budgeting and forecasting, because the higher sales the higher profits, and the aim is to boost sales as much as possible in comparison to regular demand. The process of promotion planning and operating is automized to some extent and is performed through the ERP system. Every category has its own number of quotes in the system for each promotion type, defined by the top management, and it is category management to decide what assortment is placed in promotion on the basis of KPIs and suppliers' incentives. It is obligatory for manager to provide forecast for every offer from its category, after that commercial controlling collects forecast for the whole promotion activity and perform plan and fact analysis with further report to commercial director. As it was said earlier, retail chains in Russia compete mostly in terms of the most attractive to customer promotion offers. Thus, it is important to emphasize the points where the fact result was different from management expectations for further promotion process improvements. In parallel to plan and fact analysis it is also important to perform analysis versus previous year, because one of the main criteria for the promotion activities is to show more efficiency in terms of sales and margin. Most of the promotion activities are repetitive from year to year, meaning that it is possible to compare each activity to its analogue in previous year. Such analysis gives a view on which promotion activities are less effective than in previous year and to identify reasons of that, there is also a KPI for managers to show a certain uplift in sales for each promotion activities, it is more crucial for catalogues due to high sales share.

Separate and one of the most important parts of promotion management is planning of the highly promoted offers. Highly promoted offers consist of cover pages of catalogues, weekly offers and billboards. All these promotions are strategically important to the company and are approved directly by commercial director. The reason for such significance is strong price competition between retail chains, it is important for offers with widespread communication support to be the best offer among the competitors, otherwise such promotion can result in negative effect demonstrating to consumers the price that is higher than competitor's. Highly promoted promotions are under tight control from commercial department in terms of price monitoring and are analyzed by commercial controlling in terms of forecast execution. The process of highly promoted offers planning starts with financial information from commercial controlling on fact

sales of such offers in comparable promotion activities and in comparable previous period. On the basis of this information commercial department provide a pool of offers with forecasts and together with commercial controlling identify possible weak points and approve the final list of offers. The execution of highly promoted offers' forecast is performed on the weekly basis for possible instant reaction for possible instant reaction on adverse factors, also category managers have a forecast accuracy as KPI.

2.3 Loss leader promotions in Lenta

There is relatively new type of promotion activity in Lenta that is called "crazy discounts" and can be classified as loss leader promotions. Crazy discounts were firstly introduced in 2014 and at the moment take approximately 1-3% of company's sales, but such relatively small sales share does not reflect the importance for the company for several reasons.

First, crazy discounts have different mechanics from regular promotions that were described previously. Crazy discounts activity provides deep discount, usually more than 30% from regular price, but only *for one day* and for *certain product category*. For instance, discount -40% on all fresh meat only on 01.04.2019. The difference from regular promotions is significantly deeper discount and the majority of products is sold with negative margin. In contrast to regular promotion activities that have *promo margin* and *higher sales*, crazy discounts *negative margin* and *significantly higher sales*, but for a specific category. The management expectation from such activities is to "sacrifice" a chosen category's margin in exchange for traffic (more purchases or number of receipts). Crazy discounts are supposed to stimulate people to make extra visit or to choose Lenta between competitors.

Second, in contrast to regular promotions crazy discounts are purely retailer's incentive. As it was said earlier, commercial managers approve special conditions with supplier on chosen assortment within a specific promo activity. Logically, it is not possible to provide profitable conditions for all or at least a significant part of products of the whole category, because there can be hundreds of different suppliers. It is also unreasonable from a supplier's side to participate in such activity, because a supplier's interest to promote his own product, not the whole category with competitors. Thus, crazy discounts in Lenta reflect multiproduct nature of the retailer and represents the retailer's investment for additional customers attraction.

Third, along with margin investments crazy discounts are supported with strong personal communication. Contrary to regular promotion activities that have widespread communication, crazy discounts are supported by CRM department. Crazy discounts communication is performed through several channels: SMS, Viber, E-mail and Push-notification in Lenta's mobile application. E-mail and Push-notifications are conditionally free for the company require only personnel expenses. However, SMS and Viber messages have variable costs depending directly on the number of messages sent, and with more than 10 million Lenta's active cardholders the costs to spread the communication on all clients are unreasonably high. It is CRM department's responsibility to perform client analysis, identify clusters and make communication as effective as possible, to select the most appropriate clients and justify the number. Costs for crazy discounts communication support approximately takes 0,2% from total company's sales. Important to notice that CRM department have methodology for communication channels effectiveness assessment in terms on conversion and coverage. Nevertheless, it is still naturally impossible to know why an exact customer arrived into a store, and even more impossible to scale such knowledge on millions of customers. Moreover, communication channels effectiveness assessment possibly provides a view on which one is better but does not give a view on financial effectiveness of promotion activity in terms of sales and margin.

Crazy discounts are also included in current promotion and controlling processes. Despite the totally different mechanic and financial aim, the planning and execution process is organized the same way as regular promotions. Commercial controlling calculates actual sales for comparable previous periods for separate crazy discount activities (specific categories) and compare them with proposed offers with sales forecast. Based on the forecast from commercial department, controlling performs the analysis of the weak points and investigate periods with lower coverage of crazy discounts activities. The problem of such approach is that it only gives an approximate view on coverage of crazy and can be used to cover periods with less proposed promotion intensity. The reason for that is analyzing sales of category chosen for crazy discount does not make sense in terms of *financial efficiency*, because. based on previous discussions, the expected role of crazy discounts is to stimulate additional store traffic, therefore sales of selected category give no view of the additional profits due to increased traffic. Moreover, the more sales of promoted category the more the loss (investment) because of the negative margin. The reason why controlling perform forecasting and execution control the same way as classic promotion is the simplicity and clear understanding for business partners. Nevertheless, with such approach the real financial efficiency of these promotions remains uncertain, and planning process as well as

decision making in terms of categories selection is based on the "stomach feeling" and managers' expertise.

While the true financial efficiency of such promotions remains uncertain, the management of Lenta believes in them to high extent and the number of crazy discount days grows from month to month. As it was described above, the current financial assessment and control model does not provide the view on true profitability, because the effect of such promotion activities in indirect and cannot be obtained from approachable financial information, but the requirement of such model for business vital, because such information potentially can significantly accelerate competitive advantage.

2.4 Data and data sources

Most of Lenta's data processing is organized through SAP ERP systems. SAP ERP makes it possible to collect, store and analyze data from many of sources. SAP ERP operates on the basis of SAP HANA database that consolidates and process most of the data available for Lenta users. For example, logistics department initiate and use the information about inventories movement, commercial department initiate and use the information about promotions and prices, financial department create and monitor entries, CRM department is responsible for costumer information and analytics. Ability to process huge data streams is the only one feature of ERP systems, but also automatization, which opens the directions for deep and timely analytics and reactions. Point-of-sale (POS) software that installed directly to cash register automatically collect all the detailed data for every receipt and give it out directly to SAP HANA servers. For instance, information on every purchase consists of client identification number, the list of SKUs in the receipt, promotions' identification code, sales including VAT, sales excluding VAT, sales in pieces, the final discount for every SKU, gross margin (simple margin without bonuses) and many other parameters. IT-infrastructure of Lenta automatically collect and store millions of receipts on a daily basis with the lowest possible level of detail.

While ERP system and all connected data streams are automatic to high extent and is managed by IT-specialists, it is good for processing and collecting data, using its resources for querying and analysis means to spend the resources of productive servers that may finally lead to data collapse. Nevertheless, for analytical purpose and calculations company use SAP Business Warehouse that is based on the technology of OLAP cubes and allows to aggregate data from

different sources, aggregate it and perform required calculations without overloading the productive servers. The problem of SAP BW and other analytical tools in Lenta, that they consist of different reports which are managed by IT-specialists and they are able to process and give out very limited data volume, usually less than million rows. Hence, such warehouses are not useful for big data analysis, because any significant change in a report or creation of a new one is impossible without help of IT-specialists, and computing power is very limited.

In order to open the possibilities for big data analysis and to boost capabilities of analysts the Hadoop software was added to Lenta's IT-infrastructure. The Apache Hadoop software library is a framework that allows the distributed processing of large data sets between clusters of machines using relatively simple programming models. It scales up from single servers to thousands of machines, each offering local storage and computations. Instead of relying on hardware to provide high availability, the library itself is designed to detect and debug failures on the application level and deliver a high availability service from cluster of computers, each of which may be prone to failures. The Apache Hadoop project is open-source software that helps for reliable, scalable and distributed computing. To operate Apache Hadoop Lenta uses Apache Hive warehouse for reading, writing and managing large datasets in distributed storage using SQL. Most of data that is gained from POS and useful data from SAP HANA are automatically replicated to Hadoop for big data analysis purposes. The connection to warehouse is realized through ODBC driver, which enables to query data using different software, such as Excel, Power BI or Python.

Lenta's promotion activities management in terms of data is organized through SAP ERP. There are specialists in commercial department that are responsible for managing the data, such as information on SKUs, commercial direction trees, information on promotion activities. Database management of promotions is organized using special promotion classification that consists of three levels of hierarchy: *promo category, promo theme and promo action*. The process starts with planning, the separate department of promo planning in cooperation with commercial department defines what promotion activities will be hold. On the basis of this information, database department prepare all required quotes for every promotion activity divided by product categories. After that each category manager using the promotable tool define what SKUs and at what price will be placed in promo activities on the level of *promo actions*. POS software in stores process the data exactly on the level of promo actions, later promo actions are aggregated to promo themes and promo categories using the directory. The directory of the promotion activities is created and managed by database specialists of commercial department. Promo themes is the middle aggregation level and it stands for specific promo activity, such as name of a catalogue. Promo

category is the last level of aggregation and it represents the promotion type defining whether it is a catalogue or a facade. All future analysis on financial data in terms of promotions activities is done using this direction in the system. The obvious disadvantage of promo classification is that not all promo actions are identified and there is a big portion of other promo, that requires manual adjustments.

The following financial information by promotion activities is collected for analysis: sales excluding VAT, gross margin, sales in pcs and discount. Hadoop and big data facilities made it possible to query data on date-store-SKU level with all necessary aggregations with help of existing directories. Usually promotions analysis is performed in terms of sales because simple gross margin does not give any view on true profitability, because it is lack of bonuses from suppliers. While some food product categories are under Russian trade law and are unable to gain more than 5% of buying volume in bonuses, other categories are free in gaining receiving bonuses from suppliers in unlimited portions. For that reason, simple gross margin for some products is always negative, because it is lately compensated with bonuses. Thus, gross margins in promotion analysis are only useful in analysis deviations versus previous year or comparable promotion activities. Also, big data facilities made it possible to collect information on the amount of receipts and clients for different promotion activities and product structure.

Information about days of crazy discounts and categories was collected from commercial department reports and processed manually, the categories was identified and aggregated where applicable. The information on past promotion activities was collected for 2018-2019 years period. Information about past promotion activities and categories was used for model building, calculation of promotion effectiveness components by categories and analyzing the financial efficiency by product categories. Also, the analysis requires the information about investments in personal communication support and this information was obtained from CRM reports manually and joined with the table with description by dates and categories.

For the purposes of the research, the financial information about the main promotion activities and overall store traffic was required for the 2 years period. Calculation of promotion activities efficiency components required the financial information on specific receipts, the amount of which exceeds 400 million for two years. The processing and obtaining such information were only possible through SQL queries from Apache Hadoop database with the raw data with the lowest level of aggregation. Model building and prediction processes was realized using Python workspaces. Some financial information for the research was collected directly from the ERP system.

2.5 Methodology

On the result of analysis of previous studies and promotion activities types it was concluded that "crazy discounts" in Lenta are designed to generate store traffic and complementary sales. As positive relationship between loss leader and store traffic is supported by previous researches, finding the relationship is not under the scope of current research. The objective is to *estimate* financial impact of crazy discounts promotions on the company in the way understandable for managers and practically applicable. As incremental sales growth is a combination of store traffic and average receipt and while crazy discounts are expected to affect both there is a need to assess these factors separately. In a line with positive effects the cannibalization of future regular sales will be assessed as a cost of the promotion.

Based on the existing literature analysis and discussions with management, the financial efficiency of crazy discounts in Lenta is assessed based on five interacting components: additional traffic, average receipt, post-promotion cannibalization, margin losses and investments in communication. Margin losses and investments in communication are available directly from the company's internal reports and direct financial information from ERP system. On the other hand, *additional traffic, average receipt and post-promotion cannibalization* are indirect effects, also called as halo-effects, and are not achievable from common financial information, the correlation analysis is required for assessment and this is in the scope of current research. All mentioned above effects are assessed separately because of different nature. Another reason for that result from previous overview is that there are many factors, such promotions and events, that also affect all these components and there is a need for crazy discounts effect isolation.

Based on the incremental traffic analysis, the two different product categories with the highest assessed additional traffic for two years were selected for the detailed financial efficiency assessment. The formula for the total profitability of selected category's crazy discounts promotions is presented below:

$$R = ((\bar{tr} - tr) * avg\_receipt - cbn) * 25\% - margin\_loss - com\_costs \quad (1)$$

Where:

R – total return in rubles for a selected category;

$\bar{tr}$ – estimated store traffic in case of the absence of crazy discounts;

tr – actual store traffic for the day;

avg_receipt – assessed average receipt for additional traffic for a selected category;

cbn – estimated effect of post promotional cannibalization;

margin_loss – margin losses due to negative margin sales of the selected category;

com_costs – costs on communication support of the promotions;

The logic behind that formula corresponds with current policies of the company for business cases profitability assessment and with existing literature. The reason for multiplying the term inside the brackets by 25% is that the result inside the brackets is presented in the sales and the profitability is assessed in term of gross margin. The number 25% is agreed in the company percentage of margin for profitability assessment. It was explained previously that final margin is presented only on high level of aggregation and is calculated manually, it is not possible to assess the profitability more precisely for the purposes of current research. Margin losses and costs on personal communication are available directly from financial information and directly affect margin. The detailed methodology for all efficiency components is presented further.

2.6 Incremental traffic estimation

To assess the incremental store traffic the baseline demand method was chosen as most suitable for contemporary business conditions, such approach was suggested by Leonardo D. Epstein [6]. Baseline approach represents building a prediction of regular demand for the period of promotion intervention to find the amount of demand that exceeds the regular as a result of any intervention. As it was discussed previously in details, approximately 40% of the total company's revenue is gained through four main types of promotion activities: regular and seasonal catalogues, weekly offers and billboards. The important point is that all these promotions are presented in Lenta *constantly* with regular change. Thus, these four types of promotion activities occupy the most significant sales share and are presented in the stores on every day of the year. On the one hand, in current business conditions there is an absence of periods without any intervention. But there is an opportunity to adapt and use all main regular interventions to predict baseline traffic. The reason for predicting the traffic and not the sales is that sales already include the effects of mix-effect and average receipt effect.

The baseline model for additional traffic of crazy discounts days is the core model for current research, because in case of incremental traffic absence all positive financial efficiency components are eliminated consequently, because average receipt and traffic are the factors of revenue of Lenta. If there is no additional traffic, then there is no additional revenue. The major estimation of crazy discounts efficiency is provided by exceeding the baseline traffic. Average receipt assessment and post-promotional cannibalization act as adjustments for more precise estimation in term of profitability.

For baseline traffic prediction model, the following assumption was made: the main four promotion activities that occupy 40% of company's revenue are main traffic builders for Lenta and knowing the sales for each of them is enough to predict baseline traffic. The baseline traffic applicable for Lenta is the number of receipts of the whole company in case of *crazy discounts absence*. The model is built on the data of total company sales of four main promotion activities and overall company traffic for the days *without crazy discounts*. The model is further used to predict baseline traffic knowing fact historical sales of these core promotion activities, which reflect the contingent traffic without the crazy discount intervention. The fact historical traffic is compared to predicted and the exceed number of receipts is *estimated additional traffic* due to crazy discounts. Such approach makes possible to assess crazy discounts activities separately by days and further aggregate on the category level for overall analysis. For the scope of current research, it is decided to identify the most effective categories in terms of financial efficiency of the crazy discounts for 2018-2019 years. The specification of the model is presented below:

$$\bar{tr}_i = \beta_0 + \beta_1 fdbb_i + \beta_2 ln_i + \beta_3 sn_i + \eta W + \gamma M + \varepsilon \qquad (2)$$

Where:

$\bar{tr}$ – total company's store traffic for the day *i*;

fdbb – sales of weekly offers and billboard promotions in rubles;

ln – sales of regular catalogues promotions in rubles;

sn – sales of seasonal catalogues promotions in rubles;

W – categorical variable representing the day of the week;

M – categorical variable representing the month;

η – vector of estimated coefficients for day of the week;

γ – vector of estimated coefficients for month;

ε – error term;

The descriptive statistics of the variables are presented in the Table 1:

	bbfd	ln	sn	tr
count	260,0	260,0	260,0	260,0
mean	28 952,9	138 917,8	84 798,0	837 179,6
std	11 878,0	43 989,4	41 799,8	105 384,7
min	8 935,6	76 166,1	24 031,2	646 667,0
0,25	21 547,0	108 746,6	55 319,3	763 146,8
0,5	26 782,7	125 053,2	76 680,2	814 398,5
0,75	33 337,9	161 506,9	103 458,4	900 244,2
max	114 440,4	371 352,6	265 121,7	1 203 489,0

Table 1

The process of model building was realized in Python workspaces, the information on estimated coefficients of baseline traffic prediction model is presented in Table 2. The OLS estimator was used for coefficient estimation, the data falls under the linear regression assumptions to satisfy Gauss-Markov theorem. During the process of model building the data was prepared, the outliers and broken values were deleted. There was no need in log transformation of the data because the distributions of both dependent and independent variables are normal-like, the sales are presented in thousands of rubles for more convenient interpretation and model output. To test for the multicollinearity the Variance Inflation Factor was calculated for explanatory variables and it does not exceed the number of 2, so we can conclude that there is no multicollinearity problem. The overall model is significant and high R^2 and R^2 Adjusted are a sign of good prediction capability of the model. As it is high seasonal component in retail, week and month categorical variables were added to the model. Eventually, only weekend days' estimated coefficients are statistically significant and were included in the final model. Only for five months estimated coefficients are statistically significant and they were included into the final model. Interesting point is that estimated coefficients for November and December are negative and omitting this variable lead to incorrect predictions. Negative coefficients adjust for higher average receipt due to New Year preparation; the reason is that revenues in November and December grow significantly but the main factor for that is significantly growing average receipt, not the store traffic. The absence of this variable would result in overprediction of traffic.

Coefficient	All coefficients	Final model
Intercept	526117* (10209)	541870* (10588)
Month [2]	-14599* (9002)	-29874* (7464)
Month [3]	19407 (9538)	ns
Month [4]	18461 (9158)	ns
Month [5]	51398* (9791)	38337* (8540)
Month [6]	68404* (9506)	53175* (8200)
Month [7]	42743 (9295)	ns
Month [8]	39135 (10527)	ns
Month [9]	-8052 (15820)	ns
Month [10]	-2758 (9457)	ns
Month [11]	-11287* (11620)	-30874* (10584)
Month [12]	-17439* (14356)	-47877* (12540)
Weekday [2]	14764 (11209)	ns
Weekday [3]	19171 (5479)	ns
Weekday [4]	68244 (19938)	ns
Weekday [5]	58793 (19972)	ns
Weekday [6]	105926* (11931)	84181* (11745)
Weekday [7]	53291* (7051)	37849* (6646)
ln*	1,2* (0,1)	1,3* (0,1)
sn*	0,7* (0,1)	0,6* (0,1)
bbfd*	1,3* (0,2)	1,3* (0,2)
R squared	0,88	0,91

Table 2

* – significant on 0,05 level;

ns – not significant.

Further the same data was collected for days with crazy discounts activities and the predictions of baseline traffic were made using the current model. The difference between exact traffic at the day of crazy discount promotion is estimated incremental traffic due to promotion implementation, because as all major traffic building factors were included according to made earlier assumption with high level of confidence this extra traffic is considered to be a result of crazy discounts promotion activities. Of course, there are factors that are not possible to include into the model, but the approach is capable of reflecting the overall and tangible financial impact.

The distribution of estimated incremental traffic is presented on the Figure 1. The distribution in normal-like and as it is seen from the graph the majority of data is more than zero, indicating both of good model prediction capabilities and overall positive effect of crazy discounts for the company. Such distribution supports the logic that there are possible stronger effects than crazy discounts but there is an overall positive effect that is tangible on the high level of data aggregation. Of course, the negative traffic effect from the extra promotion is not possible and contradicts the common sense, because additional promotion activity could not be a reason of customers outflow. Nevertheless, negative incremental traffic is a sing of another stronger factors affecting traffic at a specific date or low effectiveness of crazy discounts activity. Thus, negative incremental traffic values are not excluded from the analysis in order to avoid overestimating the effect following the logic that any financial effect must be substantial enough to cover all negative values. Otherwise, the estimated effect can be a result of normally distributed statistical errors, not the real impact of promotion activities.

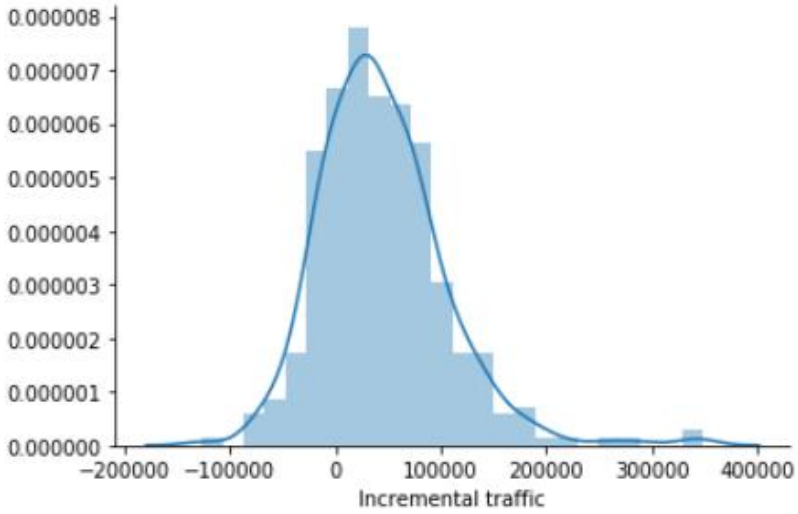

Figure 1

On the Figure 2 the graph represents the principle of model on the example of Confectionary category. The dark line represents the traffic that was predicted based on the model, the expected traffic in the absence of crazy discounts based on the main traffic driving categories. The light line stands for the fact store traffic at that day, and for most of the days the fact traffic is slightly higher than the expected. For some days the difference is higher, for some days predicted traffic is higher than actual. The normal variability of these differences represents the effects of crazy discounts, because all the most significant traffic driven factors are already considered on the model. As it will be seen further, Confectionary is relatively successful category and we can observe overall effectiveness of crazy discounts of this category. Nevertheless, the results of other categories differ significantly and the categories with total negative effect are presented. Important thing is that there are three substantial peaks of store traffic, and the model behave normally even for these days with no significant effects observed for two of them. The significant peak observed on 07.03.2019 and this efficiency is also with crazy discounts plus the 8th of the March synergy.

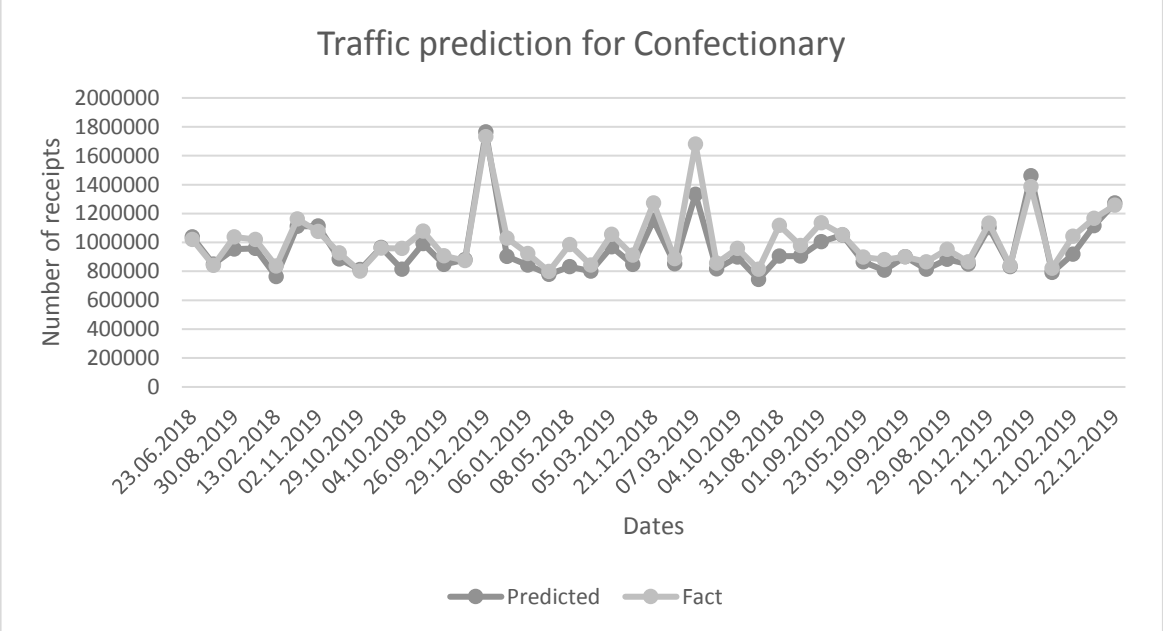

Figure 2

Further step is to analyze the effectiveness of crazy discounts in term of product categories. The data was aggregated following the logic described above and the result is presented in the Table 3. As it is seen from the table, only three categories from the list have negative estimated incremental traffic for the two year period and their frequency is one of the least, meaning that management indeed is not prone to use these categories for loss leader promotions. The second

column of the Table 3 shows the total estimated incremental traffic for two years due to crazy discounts of listed categories. Top-4 most frequently promoted categories are indeed the main traffic builders among crazy discounts related product categories. This results strongly supports managerial expectations in terms of category selection for loss leader promotion, that increases the probability that selected approach reflects the effectiveness in terms of traffic generation in all substantial moments. The results of chosen model are in general consistent with managerial expertise and intuition that increase the reliability of the model in terms of purposes of current research.

The total estimated additional traffic from crazy discounts activities for two years is 15 million. Top-5 product categories with the highest impact are: Confectionary, Meat, Sausages and Poultry, their share in total result is 48%. Nevertheless, it is also important to consider the incremental traffic per one promotion activity. From that point of view, the most successful category is Eggs, and again the result is consistent with the basic intuition, because all crazy discounts on this category are associated with Easter preparation, and this event itself is supposed to be good at generating traffic. The next successful category is flowers and such increased traffic is associated with preparation to March 8th celebration that supports the intuition of strong ability to generate traffic. There are three categories with negative results, but for Pelmeni and Grocery there too few crazy discounts days, so it is not correct to conclude that these categories are not successful. Nevertheless, crazy discounts for Electro category show the negative value of incremental traffic, that can be a sigh, that this category is not successful and preferable for additional traffic attraction. Cosmetics, Frozen and Fish categories have one of the lowest incremental traffic per promotion, however these categories are promoted relatively often. Seasonal and Pet Food categories show strong additional traffic per promotion though they are not very often promoted, and these promotions are not associated with celebrations. Possibly, the higher the frequency of a category's promotion, the lower the response of consumers. But it is still a reasonable recommendation to give a try to more traffic generating categories. The third category with the most significant impact is Sausages, but it has relatively low additional traffic per one promotion, meaning that possibly this category does not drive traffic to the extent expected. It can be reasonable to increase frequency of Poultry category's crazy discounts, because every promotion gives for additional traffic than for Sausages category.

Category	Incremental traffic	Number of promotions	Traffic per activity
Confectionary	2 533 284,72	45	56 295,22

Meat	1 492 155,62	25	59 686,22
Sausages	1 247 288,11	36	34 646,89
Poultry	1 189 342,92	20	59 467,15
Eggs	904 123,74	9	100 458,19
Ice-cream	789 142,96	17	46 420,17
Detergents	745 154,60	13	57 319,58
Cheese	682 356,63	15	45 490,44
Clothing	677 924,38	18	37 662,47
Oil	653 142,34	13	50 241,72
Pet food	610 564,36	9	67 840,48
Cookware	597 739,85	12	49 811,65
Diapers	479 229,00	11	43 566,27
Seasonal	396 591,54	5	79 318,31
Garden	366 742,44	6	61 123,74
Cosmetics	362 198,34	17	21 305,78
Home textile	292 490,23	9	32 498,91
Frozen	290 001,40	15	19 333,43
Fruits&veg	277 149,68	8	34 643,71
Tea&coffee	266 741,07	7	38 105,87
Fish	232 486,17	17	13 675,66
Flowers	195 284,78	2	97 642,39
Toys	193 614,93	4	48 403,73
Functional	26 943,38	2	13 471,69
Horne facilities	25 130,09	1	25 130,09
Soft drinks	84,70	1	84,70
Grocery	-12 586,27	1	-12 586,27
Electro	-65 069,15	8	-8 133,64
Pelmeni	-76 175,15	3	-25 391,72

Table 3

The observed results suggest that crazy discounts indeed affect store traffic of Lenta. The majority of categories that was selected as loss leaders for 2018-2019 years were successful in generating store traffic. Nevertheless, the average incremental traffic per one day differs significantly between categories, there are many possible explanations of them that is more of commercial department competences and is out of scope of current research. While there was observed substantial effect on store traffic, there are still components remain to find the financial profitability, because the store traffic is only one factor of financial efficiency. The average receipt may substantially differ both between categories and between crazy discount day and regular day. Based on the analysis above, the two categories with the most significant estimated incremental traffic are chosen for further profitability modelling: Confectionary and Meat. The selection of

such categories is also reasonable from the commercial view, because these two categories are not connected and with high probability have different features. The aim of the research is to develop model for true financial efficiency assessment of crazy discounts in Lenta, that can be used in practice for financial controlling purposes. Though the approach is universal for all categories, every specific promotion requires manual process and the resources needed for all categories analysis for past two years are unreasonably high. Thus, the two selected categories occupy 26% of all estimated traffic effect and detailed analysis of them is enough to give extended view on potential od crazy discounts in terms of financial profitability.

2.7 Average receipt estimation

To transform incremental traffic into incremental sales due to crazy discounts promotion the estimation of the average receipt for additional traffic. It is impossible to identify what receipts appeared due to crazy discounts promotion. If such opportunity existed, there would be no complexity with the financial effectiveness of crazy discounts assessment. Nevertheless, for the maximum precise financial effect assessment the estimation for the average receipt required for each specific category, because according to existing literature and discussions with management consumer behavior can significantly differ between categories. Moreover, the analysis of existing literature on the topic suggests that there is a possible effect of complimentary increase of sales or the opposite complimentary reduction of sales. It means that average receipt during the crazy days can be higher or lower than regular for that category.

To analyze significant differences between regular average receipt and average receipt for the day of the crazy discounts only receipts that *contain a selected category* was queried from the database. The dummy variable for crazy day was introduced to assess the effect on average receipt on the day of crazy discounts. The data consists of sales of a selected category in thousands of rubles and the sales for other categories *in selected receipts* for each day. The regression analysis is used for that purpose due to its universality and because it helps to identify the isolated effect of crazy discounts activities. As with baseline traffic model, OLS estimator is used for coefficients estimation, but the model is used for exploring relationship rather than predicting. And as it was said earlier, it is built for estimation of only one component, the major effect is determined by the baseline traffic model. Another point is that the model is built for each analyzed category separately, so the results and goodness of model may vary between categories.

The specification of the model is presented below:

$$avg\_receipt_i = \beta_0 + \beta_1 cat\_sales_i + \beta_2 crazy + \eta W + \varepsilon \quad (3)$$

Where:

avg_receipt – average receipt excluding the sales of selected category for the day *i*;

cat_sales – sales of chosen category in thousands of rubles for the day *i*;

crazy – dummy variable representing degerming whether there are crazy discounts for selected category for the day *i*;

W – categorical variable representing the day of the week;

η – vector of estimated coefficients for day of the week;

ε – error term;

As it was said earlier, the two categories with the most substantial impact on estimated additional store traffic were selected for deeper analysis. The first category to assess is Confectionary, the data was queried and prepared, only the receipts containing the selected category were gathered and aggregated on daily level for two years for the whole company.

The descriptive statistics of the variables are presented in the Table 4:

	cat_sales	sales_other	avg_receipt
count	730,0	730,0	730,0
mean	64 738,8	505 626,9	1,3
std	31 388,1	189 783,9	0,5
min	29 049,8	151 959,7	0,3
0,25	47 232,0	367 964,6	0,9
0,5	56 310,0	465 010,0	1,2
0,75	67 837,1	586 397,0	1,5
max	259 895,6	2 086 982,8	6,4

Table 4

The estimates of the coefficients of the model are presented in Table 5. The overall model is significant, the R^2 and R^2 Adjusted are less than 0,8, but the model is used for analyzing relationships rather than for predictions and it is not a problem. Statistically insignificant weekday coefficients and all month coefficients were excluded from the model. As it is seen from the model

output, total sales of the category positively affect the average receipt excluding the chosen category. What is interesting for the purposes of the current research is difference of average receipt for Confectionary-including receipts on the day with crazy promotion, the difference is statistically significant and means that average receipt is 111,2 rubles less on the day of crazy discounts due to the factor of crazy. This result means that consumers are likely to purchase only promoted item without any complementary sales that significantly drops the average receipt. In other words, for current category the complementary sales decrease is observed, meaning that on average marginal revenue for this category is less on the day with crazy discounts than on regular day. Thus, the regular average receipt for the category must be reduced on this crazy discounts negative factor, the reduced number can be used as estimated average receipt for additional crazy-driven receipts for the category obtained in the previous part of the research to get the highest precision in financial effect estimation. The final estimated average receipt for the category is obtained with the Formula (4).

Coefficient	**All coefficients**	**Final model**
Intercept	0,23* (0,05)	0,38* (0,04)
Weekday [2]	0,03 (0,04)	Ns
Weekday [3]	0,01 (0,04)	Ns
Weekday [4]	0,13* (0,04)	0,13* (0,04)
Weekday [5]	0,32* (0,04)	0,32* (0,04)
Weekday [6]	0,56* (0,05)	0,58* (0,04)
Weekday [7]	0,34* (0,04)	0,35* (0,04)
Month [2]	0,10 (0,06)	Ns
Month [3]	-0,05 (0,06)	Ns
Month [4]	0,13 (0,06)	Ns
Month [5]	0,11 (0,06)	Ns
Month [6]	0,15 (0,06)	Ns
Month [7]	0,11 (0,06)	Ns
Month [8]	0,06 (0,06)	Ns

Month [9]	0,05 (0,06)	Ns
Month [10]	0,06 (0,06)	Ns
Month [11]	-0,06 (0,06)	Ns
Month [12]	-0,06 (0,07)	Ns
Crazy [1]	-0,123* (0,05)	-0,111* (0,05)
cat_sales	1,30E-05* (5,87E-07)	1,11E-05* (3,98E-07)
R squared	0,67	0,68

Table 5

* - significant on 0,05 level;

ns – not significant.

$$\widehat{avg\_receipt} = \frac{ttl_{sales}}{ttl_{receipts}} - \widehat{crazy\_factor} \quad (4)$$

Where:

$\widehat{avg\_receipt}$ – the estimated average receipt for the category's additional traffic;

ttl_{sales} – total revenue gained by the receipts including the category for the days without crazy dicounts;

$ttl_{receipts}$ – total number of the receipts of the category for the days without crazy discounts;

$\widehat{crazy\_factor}$– the estimation of effect on complementary sales based on the regression analysis;

According to the formula, the estimated average receipt for Confectionary category is following:

$$\widehat{avg\_receipt}_{conf} = \frac{385\,088\,387\,183{,}31}{277\,891\,194} - 111{,}2 = 1274{,}6$$

Thus, the estimated average receipt for additional crazy-driven traffic for Confectionary category is 1274,6 rubles for receipt.

The second category to assess is Meat, the data was queried and prepared, only the receipts containing the selected category were gathered and aggregated on daily level for two years for the whole company.

The descriptive statistics of the variables are presented in the Table 6:

	cat_sales	sales_other	avg_receipt
count	706,0	706,0	706,0
mean	46 985,6	166 363,3	1,7
std	17 260,4	64 662,8	0,2
min	10 798,4	32 701,5	1,1
0,25	33 864,8	113 588,6	1,5
0,5	43 233,7	149 893,7	1,6
0,75	57 220,3	211 698,4	1,8
max	98 609,2	388 306,1	2,6

Table 6

The information on estimated coefficients are presented in Table 7.

Coefficient	All coefficients
Intercept	1,41 (0,03)
Weekday [2]	-0,04* (0,03)
Weekday [3]	-0,05 (0,03)
Weekday [4]	-0,02 (0,03)
Weekday [5]	0,00 (0,03)
Weekday [6]	-0,04 (0,03)
Weekday [7]	-0,01 (0,02)
Month [2]	-0,07 (0,03)
Month [3]	-0,04 (0,03)
Month [4]	-0,04 (0,03)
Month [5]	0,00 (0,03)
Month [6]	-0,01 (0,03)

Month [7]	-0,07 (0,03)
Month [8]	-0,06 (0,03)
Month [9]	-0,04 (0,03)
Month [10]	-0,04 (0,03)
Month [11]	0,01 (0,03)
Month [12]	0,00 (0,03)
Crazy [1]	0,01 (0,04)
cat_sales	6,78E-06* (3,86E-07)
R squared	0,33

Table 7

* - significant on 0,05 level;

ns – not significant.

Though the overall model is significant, total sales of the category positively affect the average receipt excluding the chosen category, but most of the weekday and month coefficients are not statistically significant. What is more important, the coefficient of crazy discounts day is not statistically significant, it means that average receipt for Meat category does not change significantly during days of crazy discounts promotions. Moreover, the average receipt for Meat category does not differ significantly neither between weekdays nor between months. The current model output suggests that for the receipts including Meat category average spent does is relatively stable. The possible explanation for this phenomenon is that Meat is a type of category that unlikely to be bought single. The managerial intuition suggests it is a rare case when consumers visit a store to buy only meat, even on the day of the crazy promotions. The products from Meat category are less convenient in transportation, motivating people not to make this purchase apart from regular stock-up. Thus, the estimated average receipt for additional traffic for Meat category does not differ significantly from regular average purchase for the receipts including the category and equals to 2212,8 rubles. Such high average receipt reflects the feature that Meat category is more often a part of big stock-up rather than small purchases.

In this section of the research the estimated average receipts for two chosen categories with the most significant impact were obtained. This result will be later used in the formula underlined earlier in order to transform incremental traffic into incremental sales with the reliable level of precise. The current analysis shows that the behavior of different categories in terms of marginal revenues can vary substantially. The result suggests that the value of every additional receipt in terms of revenue is nearly twice higher for Meat category than for Confectionary. The intuition behind this conclusion is the different consumer behavior, the Confectionary products are more likely to bought in single than Meat products, dropping the average receipt significantly. For more precise financial efficiency estimation each category's marginal revenues potential must be analyzed separately, that further allows to perform correct comparative analysis of the specific promotion categories.

2.8 Cannibalization effect estimation

As the review of the existing literature suggests, there is possible negative effect on post-promotion demand called cannibalization. This problem is more relevant for Lenta's regular promotions in which the company is interested in higher sales, because margin is lower but still positive and reasonable. It is possible that post-promotion demand drops more than the initial uplift during the promotion period, resulting that post-promotion lower demand cover the substantial portion of the uplift. In case of crazy discounts Lenta is not interested in higher sales of promotion category, because the margin during the promotion is negative or close to zero. As it was said earlier, in case of crazy discounts the higher sales only result in higher margin losses and not the additional profits. Nevertheless, it is still possible that regular demand with normal margin after the crazy discounts is dropped resulting in negative effect of the promotion.

The existing literature does not give a clear view on the periods for the possible post-promotion cannibalization effect. Moreover, there is no specific analysis of the mechanics similar to crazy discounts in Lenta, and the relevant post-promotion period specifically for this case is hard to identify. Based on the discussion, it is identified that management considers the cannibalization as a significant problem and that it should be taken into account at least in the scope of current research for the future understanding. The proposed period for possible post-promotion cannibalization effect assessment is two weeks after the day of the crazy discounts activities. Based on the expert opinion of commercial department managers, it is the least period for the cannibalization effect to be noticeable.

Thus, the possible post promotion cannibalization is estimated on the period of 2 weeks after the day of the promotion. The calendar of crazy discounts category is not systematic and usually is driven by different business conditions, such as stock-ups of the category, falling traffic trend, low promotion intensity. Although crazy discounts are usually planned, it can be an instrument of short-term reaction on different adverse factors, such as competitor's lower prices or problems of some regular promotions. Due to such chaotic nature, there are cases when crazy discounts activities for one category go straight one after another with small time period between them. As it proposed by the company's management it is reasonable to test for cannibalization only for those activities where there is at least two weeks period after them.

In contrast to previous steps of the research, cannibalization effect can only be assessed only through manual processing for every crazy discounts day. As it was showed previously, there are 45 days for Confectionary category and 25 days for meat category analysis. Another difference that the effect is tested for the period not the single day, so it is reasonable to compare averages during the post promotion period and regular average sales of the promoted category. For the analysis the following assumption is made: the possible post-promotion cannibalization effect is considered only if there is a statistically significant difference between the post-promotion average sales of the category and regular average sales of the category. To test the statistical significance, it was decided to take both parametric and non-parametric statistical tests for the means difference significance. So, it was decided to use the one-tailed T-test in combination with Mann-Whitney one-tailed non-parametric test. The cannibalization effect is suspected to exist only with showed statistical significance by both tests, the tests are one-tailed, because for the purpose of the current research only negative difference between means is considered.

For those days where there is statistical significance for both tests the possible cannibalization is assessed. Another assumption is made for analysis: the cannibalization effect cannot exceed the initial sales uplift during crazy discounts day and is equal to zero in the case of the sales uplift absence. The estimated cannibalization effect for such days is estimated using the formula below:

$$\widehat{cbn} = \sum_{i=1}^{14}(sales_i - \overline{sales}) \qquad (5)$$

Where:

$\widehat{cbn}$ – estimated post-promotion cannibalization effect for the specific day of crazy discounts in rubles;

$sales_i$ – sales of the category for each day of post-promotion period;

$\overline{sales}$ – total average sales for the category.

As in previous part the analysis is performed for two categories: Confectionary and Meat. The test values and the estimated post-promotion cannibalization for Confectionary category are presented in the Table 8 by dates of crazy discounts promotions. Out of 45 days of crazy discounts for Confectionary category only 15 dates fall under the scope of post-promotion cannibalization estimation. For 7 days out of 15 analyzed the statistical significance was identified, and for 5 days the post-promotion cannibalization effect was accepted. The most significant cannibalization effect is observed in January as result of New Year stock-ups, the total estimated post-promotion cannibalization for the Confectionary category for two years is 315,5 million rubles.

Date	T-test	Mann-Whitney test	Mark	Cannibalization
13.02.2018	0,4031	0,9619	N	-
17.04.2018	0,0007	0,2261	N	-
08.05.2018	0,0000	0,0261	Y	-
23.06.2018	0,0000	0,0117	Y	- 68 083 135,78
04.10.2018	0,0001	0,0477	Y	- 80 600 961,09
15.11.2018	0,0739	0,0032	N	-
06.01.2019	0,0005	0,0084	Y	- 110 768 877,60
22.01.2019	0,0016	0,0996	N	-
07.03.2019	0,1438	0,0816	N	-
18.04.2019	0,0195	0,3553	N	-
23.05.2019	0,0000	0,0281	Y	- 12 765 307,47
21.06.2019	0,0000	0,0257	Y	- 43 317 670,13
02.09.2019	0,4815	0,9726	N	-
04.10.2019	0,0008	0,1034	N	-
27.11.2019	0,0004	0,0000	Y	-

Table 8

The test values and the estimated post-promotion cannibalization for meat category are presented in the Table 9 by dates of crazy discounts promotions. Out of 25 days of crazy discounts for Meat category 18 dates fall under the scope of post-promotion cannibalization estimation. For only 3 days out of 18 analyzed the statistical significance was identified, and for 2 days the post-promotion cannibalization effect was accepted. As with the Confectionary category, the most significant cannibalization effect is observed in January as result of New Year stock-ups. Similar to results of the average receipt estimation, the demand on Meat category is less sensitive to price

reductions, that supports the managerial intuition. Total estimated post-promotion cannibalization for the Meat category for two years is 263,5 million rubles.

Date	T-test	Mann-Whitney test	Mark	Cannibalization
30.01.2018	0,0185	0,0155	Y	- 129 885 562,48
24.02.2018	0,3925	0,4664	N	
25.05.2018	0,3677	0,6679	N	
27.07.2019	0,1354	0,1080	N	
09.11.2018	0,1452	0,1689	N	-
04.12.2018	0,4327	0,5188	N	-
29.01.2019	0,0145	0,0154	Y	- 133 640 893,58
23.02.2019	0,3250	0,7175	N	-
23.04.2019	0,1544	0,1573	N	-
08.05.2019	0,4489	0,3048	N	-
22.06.2019	0,1413	0,1143	N	-
06.08.2019	0,0470	0,0265	Y	-
23.08.2019	0,1207	0,0958	N	-
07.09.2019	0,1260	0,0928	N	-
27.09.2019	0,1224	0,1237	N	-
09.11.2019	0,4792	0,4632	N	-
10.12.2019	0,1700	0,1328	N	-
28.12.2019	0,3592	0,3819	N	-

Table 9

The post-promotion cannibalization is the least precise estimation of crazy discounts efficiency, because it to high extent relies on professional judgement. Nevertheless, such effect is not possible without attracting additional traffic to the store, so it is unlikely for cannibalization to cover the positive effect of additional traffic, but it is good point and instrument to hedge from overestimation of financial effect of crazy discount and potentially can absorb all underestimated adverse factors. For the scope of current research, the effect of post-promotion cannibalization was observed, but it is unlikely to be included into reporting, budgeting and control system of financial controlling function.

2.9 Final financial efficiency of “crazy discounts”

Since all estimations for incremental traffic, average receipt and post-promotion cannibalization are obtained, the further step is to estimate the financial result of crazy discounts with the Formula (1). The main objective of the research is to estimate the economic impact on the company. The formula follows this logic: first step is to evaluate the impact on gross margin, second step is to subtract all additional costs associated with crazy discounts. The additional costs are expressed in lost negative margin of promoted category and the direct costs on personal customer communication. If the estimated additional profit is higher than all additional costs on the promotion, from the financial point of view the promotions are effective.

The costs are direct and are accessible from financial information of the company's corporate systems, the analytical assessment and estimations are not required. The source of financial information for sales ang margin by categories and by days is SAP business warehouse that translates, aggregate and compute the information from Points of Sale (POS) with all required directories based on OLAP technology. As it was stated earlier it is not possible for now to obtain the full gross margin by days and by categories directly from the corporate system, because of the supplier relation properties. Nevertheless, the basic margin without bonuses from the suppliers is presented in SAP BW, because negative basic margin is the exactly the margin loss, because bonus part of margin does not change within crazy discounts implementation. Thus, the margin losses for Confectionary and Meat categories is the negative basic gross margin without suppliers' bonuses for the days of crazy discounts that are obtained from corporate ERP system.

The information about personal communication costs is not presented in corporate ERP system but is the responsibility of CRM-department. After the crazy discounts planning process is finished and the information about days and assortment is obtained, the CRM-department prepare budgets on personal communication and approve it within the marketing directory without participation of financial controlling. As it was stated earlier, the costs add up from SMS and Viber messages were sent to specific groups of clients. SMS messages are more expensive than Viber and do not give a view on whether the message was received. SMS as a communication channel is believed by management to be the most effective though, because the problem of Viber is significantly smaller coverage. The advantage of SMS is they are receivable on the majority of devices and notifications are usually not skipped, that is not the case for Viber and E-mail. For that reason, the main thoughtful process of CRM-management is related to SMS, because they are expensive, but still are expected to be more effective. The communication efficiency assessment is out of scope of current research, but it is necessary to obtain the costs for personal communication information to assess the overall efficiency of crazy discounts. The information is presented in the reports of CRM-department for a specific promotion separately and it was

collected manually and joined with data analyzed previously for both Confectionary and Meat categories.

The final profitability model for the two selected categories based on the Formula (1) is presented in Table 10. Incremental traffic is presented in number of receipts, all other measures in the table are presented in rubles. As it was stated earlier, the Confectionary and Meat are the two product categories with the highest impact on estimated incremental traffic. First line of the table represents the estimated additional traffic driven by the crazy discounts promotions of these categories. The second line of the table represents the estimate for every additional receipt driven by crazy discounts of these category. Incremental sales are obtained through multiplying incremental traffic by estimated average receipt. Incremental sales are reduced by post-promotion cannibalization effect and then multiplied by estimation margin of 25%. Estimated additional margin represents the additional profit driven by crazy discounts and is further reduced by direct costs on crazy promotions. The total financial effect from crazy discounts for Confectionary category is 247 million rubles, and total financial effect for Meat category is 369 million rubles.

Component	Confectionary	Meat
Incremental traffic	2 533 284,7	1 492 155,6
Estimated average receipt	1 274,6	2 212,8
Incremental sales	3 228 924 704,1	3 301 841 955,9
Cannibalization	- 315 535 952,1	- 263 526 456,1
Estimated additional margin	728 347 188,0	759 578 875,0
Fact margin loss	- 290 949 148,0	- 285 163 359,0
Communication costs	- 190 087 200,0	- 105 604 000,0
Profitability	**247 310 840,0**	**368 811 516,0**
Profitability per promotion	**5 495 796,4**	**14 752 460,6**

Table 10

First, results are interesting from the point of category management of Lenta as they represent the differences of product category's financial efficiency. Though the incremental traffic per promotion does not differ significantly between Confectionary and Meat categories, but the average receipt is substantially higher for meat category. It means that every additional receipt is more valuable for Meat category, in other words the marginal revenue is higher for the category. Contrary to stable average receipt of Meat category, average receipt for Confectionary category drops during the days of crazy discounts, but this fall is fully compensated with additional traffic. However, margin losses per one promotion are significantly lower for Confectionary category.

Communication costs are higher for Confectionary category because the number of promotions is higher. The key factor of a category's financial efficiency in terms of crazy discounts promotions is its marginal revenue, because the analysis shows that average receipt can differ significantly between different categories, and implementation of crazy discounts can have negative effect on it. The total financial efficiency of two years is significantly more for Meat category; however, the number of promotion days is much lower than for Confectionary, and the main factor of that change is stronger average receipt.

The following results are received by the current research:

1. Most of the product categories that were chosen for crazy discounts promotions indeed generate additional store traffic. Top four categories with the highest estimated additional traffic support the expectations of managers, but there is also a product category with systematic and negative effect of additional store traffic, which can be a valuable information for management. The research provides a strong first attempt in estimation of promotions' halo-effect on the whole company that was required by Lenta's management;
2. The estimated average receipt can be considered as marginal revenue in terms of crazy discounts promotions and the research provides the evidence that the average receipts can differ significantly between categories, that both mean average receipt requires the separate estimation and product categories have different potential in terms of marginal revenue;
3. The evidence of post-promotion cannibalization effect was obtained by current research and the effect may vary significantly between different product categories. Important conclusion is that the most significant portion of post-promotion cannibalization falls on the period after New Year due to significant stock-ups before the celebration.
4. Based on deep analysis of two categories with the highest impact on estimated store traffic the crazy discounts indeed are financially efficient for Lenta. As these two categories represent 26% of estimated additional traffic, they are to high extent are representative of the overall financial efficiency, but results may be significantly different between categories.

2.10 Methodology implication for controlling and limitations

The planning, forecasting and execution control of crazy discounts in Lenta is organized in form of cooperation of controlling department and commercial department. Controlling is responsible for preparing historical financial information about sales of crazy discounts promotions and performing comparative analysis with forecasts. The crazy discounts planning is performed once in a quarter usually with one month in advance, the scheme of crazy discounts planning is presented on Figure 3.

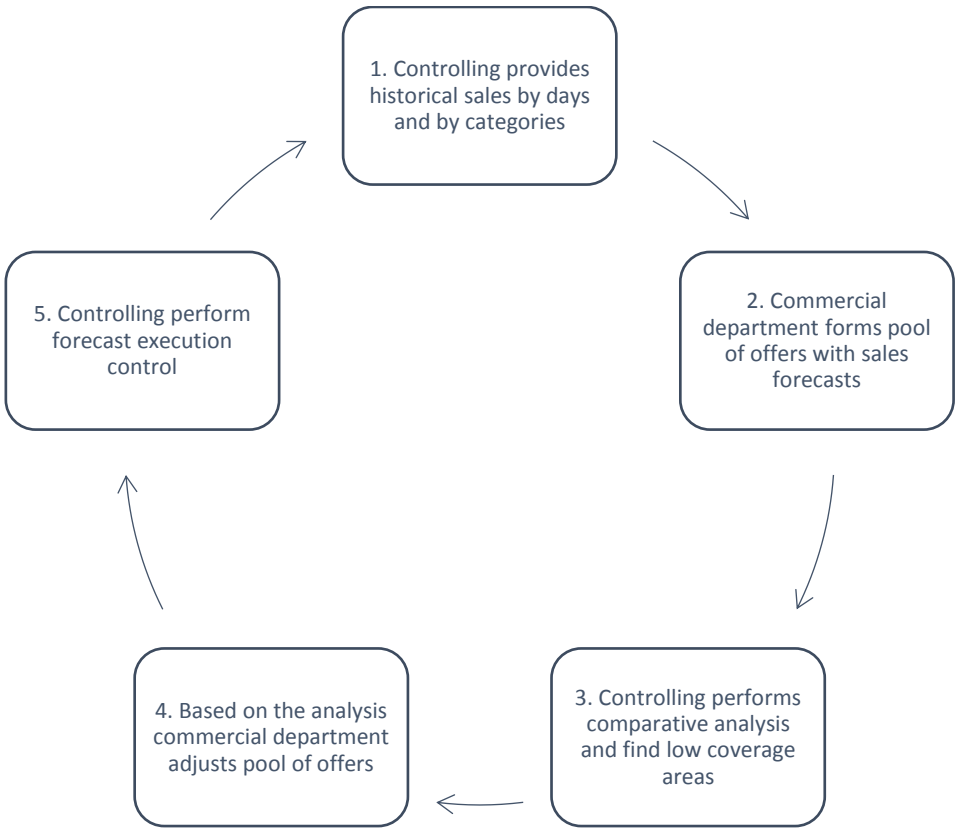

Figure 3

The first step is done by controlling, the sales for separate crazy discounts categories of previous year are collected for the quarter. It gives a view on promotion intensity of the previous year and very approximate potential of different categories. Based on this information commercial department forms a preliminary pool of crazy discounts activities with sales forecasts for promoted categories. In the next step controlling performs comparative analysis of previous year actual sales and forecasted sales. The first condition for the analysis is *to provide growth* of category sales versus previous year, that is associated with increasing the promotion efficiency. The second condition is *to provide uniform promotion coverage* based on category sales. Usually with one

iteration commercial department takes into account recommendations of controlling and adjusts the plan. The final budget of crazy discounts promotions for the quarter is approved by commercial director and further adjustments of forecasts is not possible. Further budget execution control is performed by controlling with communication to commercial director, the results are used for the next budgeting process.

The crazy discounts planning is strongly material for the company because it is this type of promotion is a significant traffic builder. It is a managerial expectation and was also approved by current research. Precise financial information and analysis is required that is why controlling plays a key role in the process. Nevertheless, for now all the budgeting and control process is organized using the sales of promoted category without the estimation the halo effect on store traffic and overall profitability. For that reason, the current approach allows to assess the coverage and promotion intensity of periods but is lack of overall financial efficiency of promotions.

The model for financial efficiency estimation proposed in current research allows to enhance the promotion planning process. The sales of promoted categories can be still used as a measure of *promotion intensity* and are useful in coverage planning. Nevertheless, the condition of increasing promotion efficiency is not approved by category sales plan and fact analysis, because they do not give a view on overall effect on the company. The increased sales of promoted categories do not guarantee the additional profits for the company because the category sales growth can be stimulated not by additional store traffic but formed within the regular traffic. Based on the findings of current research it is reasonable to propose the substitution of current post promotion execution control on the *financial profitability estimation*. Together with intensity analysis the management will be provided with actual profitability of previous promotion activities. Based on this information, the commercial department can adjust the plan decreasing the number of less profitable categories ad increasing the number of the most effective ones. The execution of category sales forecasts will be no longer required because the total profitability is known, and it is the value to maximize.

Nevertheless, there are several drawbacks of new approach. First, the methodology is rather difficult for business partners and commercial department will not clearly understand how the result was obtained. Second, commercial department will not be able to affect the result directly as it was with category sales by adjusting the prices, the halo effect on the company is obtained with combination of communication efficiency and offer attractiveness. With no clear understanding of methodology and ways of manipulation commercial department managers will be in more severe conditions and can build a resistance to new approach. But from financial point, the new approach leads to profit maximization and more efficient promotion planning.

The approach also has several limitations. First, during discussions with management it was decided that post-promotional cannibalization effect does not have sufficient methodological base and mostly associated with New Year and other celebrations periods and will not be included in financial profitability estimation. The second limitation is that there are also different factors apart from crazy discounts affecting the store traffic and it is impossible to consider all of them in the model. Thus, other traffic building factors at the days of crazy discounts will affect the financial profitability of the promotions. The third limitation is that it is a possible case of several crazy discounts categories at one day and in that case it is not possible to divide the separate effect on traffic of different categories. Instead of this the total profitability for the crazy discounts day will be provided and the impact of different categories on the effect will be assessed by commercial department managers. The last limitation is that current model does not estimate the customer communication efficiency, and the investigation why exactly the promotion has a specific effect may be required. But the proposed model does consider the costs on clients communication.

Conclusion

Based on the analysis of the existing literature on the topic, the baseline demand approach was chosen. In the current condition of Russian food retail market and Lenta in particular it is impossible to highlight the period without any type of intervention, because approximately a half of revenue is obtained through price promotions. In most of the existing researches it was possible to subtract clear period of promotion intervention for analysis without other significant factors. Proposed baseline demand model was also based on the assumption that there is a clear intervention period in which the activity is the only substantial factor stimulating additional traffic. For the practical implication of loss leader promotions in Lenta financial efficiency analysis the baseline approach was modified so that it reflects the current business conditions.

The idea is to predict baseline demand traffic based on the main traffic builders: three main promotion activities that are considered as three main revenue streams. The model of baseline traffic allows to predict traffic with high level of accuracy and to separate the effect of Lenta's crazy discounts with high level of precision. The analysis showed that most of the product categories are indeed effective in attracting additional store traffic, but there are also weak points for management to notice. The first limitation of the model of the approach was apparent on this step, the model does not account for other significant traffic builders such as federal celebrations. Thus, the most effective crazy discounts days were associated with big celebrations and additional

traffic attracted by celebration is a part of crazy discounts financial efficiency, but there are few such cases and the effect on the whole company is not material but it can be very significant for category manager. Another limitation of that model that it is not possible to separate the effects of different categories when there are several of them at one day. Based on the analysis on additional store traffic two product categories were selected for full financial efficiency estimation.

The next step of proposed model is to estimate the value each additional receipt due to crazy discounts for two categories. The analysis showed that marginal revenue of crazy discounts promotions can vary significantly between different product categories and can be a crucial factor of total financial efficiency of promotion activities. Thus, the additional revenue of crazy discounts on Meat category is higher than on Confectionary, though the last attracted more store traffic. The joint effect of traffic and average receipt leads to different profitability of crazy discounts promotions between product categories. The evidence of post-promotional cannibalization effect was obtained in previous researches. After discussion with management it was decided to estimate the effect of post-promotional for the scope of current research. The majority of post-promotion cannibalization is associated with big celebrations, such as New Year.

On the two selected product categories that had the most significant effect on additional store traffic for two years it was showed that crazy discounts promotions are indeed financially effective for Lenta. Nevertheless, the profitability between product categories can vary significantly, and it depends on both estimated additional traffic and estimated value of additional receipt. Costs on personal communication does not undermine profitability and are mostly similar per one promotion. Based on the analysis on the two most often promoted categories crazy discounts indeed have positive effect on traffic and financially profitable for the company, but there is an obvious need in separate product categories analysis.

The proposed model has strong potential to be integrated into current controlling process of Lenta. The total financial profitability allows to compare the impact on the whole company of different product categories and is a good instrument to assess the overall efficiency of promotion activities. New model is a valid replace to plan and fact analysis because it gives a better view on financial efficiency and allows to optimize the structure and intensity of crazy discounts promotions. However, there were mentioned obstacles to overcome for the new approach to be implemented. Nevertheless, the approach proposed in current research can significantly enhance financial efficiency of promotions in retail companies and is suitable not only for Lenta, but for other Russian retailers with high promotion share and who practice similar promotion mechanics.

References

1) Ailawadi, K. L., Gedenk, K., Lutzky, C., & Neslin, S. A. (2007). Decomposition of the sales impact of promotion-induced stockpiling. *Journal of Marketing Research*, *44*(3), 450-467.
2) Ailawadi, K. L., Harlam, B. A., Cesar, J., & Trounce, D. (2006). Promotion profitability for a retailer: the role of promotion, brand, category, and store characteristics. *Journal of Marketing Research*, *43*(4), 518-535.
3) Blut, M., Teller, C., & Floh, A. (2018). Testing retail marketing-mix effects on patronage: A meta-analysis. *Journal of Retailing*, *94*(2), 113-135.
4) Bogomolova, S., Szabo, M., & Kennedy, R. (2017). Retailers' and manufacturers' price-promotion decisions: Intuitive or evidence-based?. *Journal of Business Research*, *76*, 189-200.
5) Doyle, P., & Saunders, J. (1986). Measuring the true profitability of sales promotions. *Journal of the Operational Research Society*, *37*(10), 955-965.
6) Epstein, L. D., Flores, A. A., Goodstein, R. C., & Milberg, S. J. (2016). A new approach to measuring retail promotion effectiveness: A case of store traffic. *Journal of Business Research*, *69*(10), 4394-4402.
7) Gauri, D. K., Ratchford, B., Pancras, J., & Talukdar, D. (2017). An empirical analysis of the impact of promotional discounts on store performance. *Journal of Retailing*, *93*(3), 283-303.
8) Gupta, S. (1988). Impact of sales promotions on when, what, and how much to buy. *Journal of Marketing research*, *25*(4), 342-355.
9) Khouja, M., Subramaniam, C., & Vasudev, V. (2019). A comparative analysis of marketing promotions and implications for data analytics. *International Journal of Research in Marketing*.
10) Kumar, N., Rajiv, S., & Jeuland, A. (2001). Effectiveness of trade promotions: Analyzing the determinants of retail pass through. *Marketing Science*, *20*(4), 382-404.
11) Kumar, V., & Leone, R. P. (1988). Measuring the effect of retail store promotions on brand and store substitution. *Journal of marketing research*, *25*(2), 178-185.
12) Lam, S. Y., Vandenbosch, M., Hulland, J., & Pearce, M. (2001). Evaluating promotions in shopping environments: Decomposing sales response into attraction, conversion, and spending effects. *Marketing Science*, *20*(2), 194-215.

13) Leone, R. P. (1983). Modeling Sales-Advertising Relationships: An Integrated Time Series–Econometric Approach. *Journal of Marketing Research*, *20*(3), 291-295.
14) McColl, R., Macgilchrist, R., & Rafiq, S. (2020). Estimating cannibalizing effects of sales promotions: The impact of price cuts and store type. *Journal of Retailing and Consumer Services*, *53*, 101982.
15) Mulhern, F. J., & Leone, R. P. (1990). Retail promotional advertising: do the number of deal items and size of deal discounts affect store performance?. *Journal of Business Research*, *21*(3), 179-194.
16) Mulhern, F. J., & Padgett, D. T. (1995). The relationship between retail price promotions and regular price purchases. *Journal of Marketing*, *59*(4), 83-90.
17) Parsons, A. G. (2003). Assessing the effectiveness of shopping mall promotions: customer analysis. *International Journal of Retail & Distribution Management*.
18) PWC (2018). Integrated promo planning. Retrieved from: https://www.pwc.ru/ru/retail-consumer/publications/promo-excellence-2018.pdf
19) Reiner, J., & Skiera, B. (2018). Helping Merchants to Assess the Profitability of Deal-of-the-Day Promotions. *Interfaces*, *48*(3), 247-259.
20) Walters, R. G. (1991). Assessing the impact of retail price promotions on product substitution, complementary purchase, and interstore sales displacement. *Journal of marketing*, *55*(2), 17-28.
21) Walters, R. G., & MacKenzie, S. B. (1988). A structural equations analysis of the impact of price promotions on store performance. *Journal of marketing research*, *25*(1), 51-63.
22) Walters, R. G. (1988). Retail Promotions and Retail Store Performance: A Test of S. *Journal of Retailing*, *64*(2), 153.
23) Walters, R. G., & Rinne, H. J. (1986). An empirical-investigation into the impact of price promotions on retail store performance. *Journal of Retailing*, *62*(3), 237-266.
24) Zoellner, F., & Schaefers, T. (2015). Do price promotions help or hurt premium-product brands?: the impact of different price-promotion types on sales and brand perception. *Journal of Advertising Research*, *55*(3), 270-283.